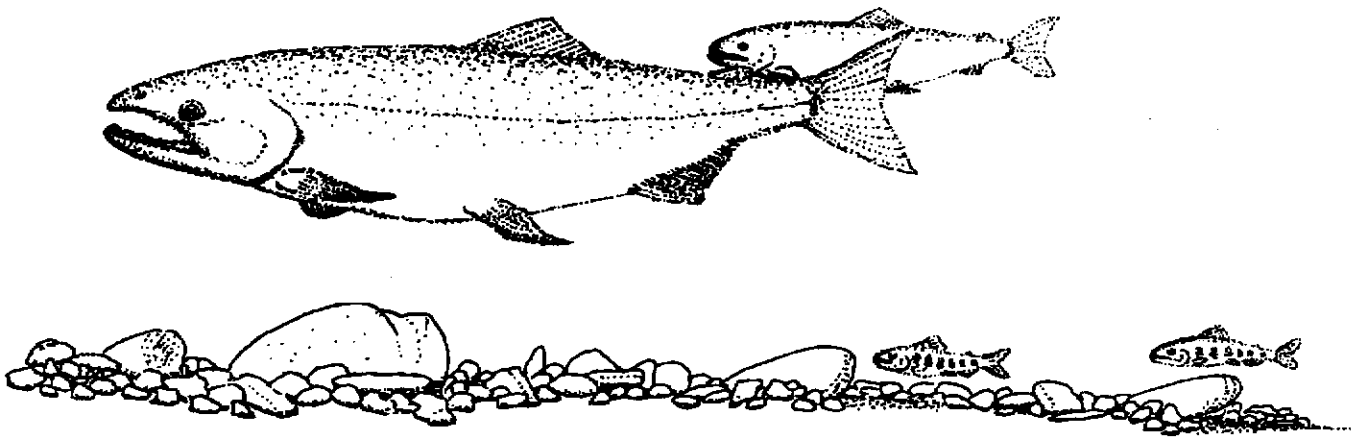
U.S. Fish & Wildlife Service

National Fish Hatchery Programming and Evaluation Activities for Puget Sound and Coastal Washington

Annual Progress Report 1998-1999

Western Washington Office
Division of Fisheries and Watershed Assessment
Branch of Fisheries Assistance

Lacey, Washington
February 2000



NATIONAL FISH HATCHERY

PROGRAMMING AND EVALUATION ACTIVITIES

FOR PUGET SOUND AND COASTAL WASHINGTON

ANNUAL PROGRESS REPORT 1998-1999

Thomas R. Kane
U.S. Fish and Wildlife Service
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PREFACE

The purpose of this report is to document annual hatchery programming and evaluation activities at U.S. Fish and Wildlife Service fish hatcheries on the Olympic Peninsula of Washington. Although this report contains some analysis of existing data and may recommend changes to programming activities, the intent is to provide annual updates and not to provide comprehensive analysis of the various programs. Individual broodyear reports will also be prepared to describe what is known about the production and performance of different hatchery stocks by brood. Comprehensive analytical reports that encompass multiple broodyears will be produced intermittently to describe trends in survival and production of the hatchery stocks. While one person may be listed as the author of an individual report, all reports result from the collaborative efforts of the staffs of the National Fish Hatcheries, Fishery Resource Office, and Fish Health Center.

INTRODUCTION

This report contains information regarding hatchery programming and evaluation activities at Quilcene, Makah, and Quinault National Fish Hatcheries (NFH) conducted from August 1, 1998 to July 31, 1999. The information is compiled using the Fisheries Resource Evaluation Database (FRED) (USFWS, 1991), designed and maintained by the Western Washington Office, Branch of Fisheries Assistance (WWOBFA). This database provides administratively required information, biological data used to describe biological characteristics of hatchery stocks, and data to correlate fish rearing variables with survival characteristics of hatchery stocks. A general summary of the types of data routinely collected at each facility is presented in Table 1. Summarized data for this reporting period are contained in Tables 2 through 8. Specific details about the data or the database are available from the Branch of Fisheries Assistance.

Fish production levels for all three hatcheries are determined in cooperation with representatives of the U.S. Fish and Wildlife Service (USFWS), tribal staffs, and the Washington Department of Fish and Wildlife (WDFW). Harvest levels, stock survival rates, wild stock interactions, and hatchery production capabilities are all considered when establishing production numbers. Programmed production goals for the broods reported in this document are presented in Table 2.

Hatchery evaluation teams for each hatchery met as specified by the USFWS Region 1 Vision Action Plan. The teams function as a focal point for involved Fish and Wildlife Service employees to participate in the programming and evaluation of the hatchery products. Membership includes hatchery staff, Olympia Fish Health Center staff, and WWOBFA staff.

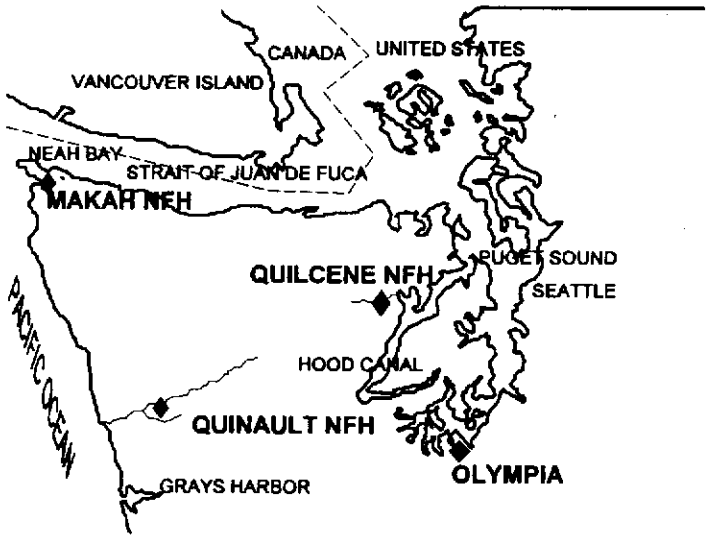

Figure 1. Western Washington locale map.

QUILCENE NATIONAL FISH HATCHERY

The Quilcene NFH production program operates under the guidance of the Hood Canal Salmon Management Plan. Fish production levels are determined cooperatively with representatives from the USFWS, Point No Point Treaty Council, and WDFW. Coho smolt production for the on-station release was mass marked with an adipose fin clip to identify them as hatchery fish for harvest in selective sport fisheries. Paired tag groups, both clipped and unclipped, were also released to model survival of unclipped wild stocks and to determine mortality effects on those fish caught in selective fisheries but released based on their adipose clip status. Summer chum continue as a high priority program at the hatchery. Hood Canal summer chum were listed by National Marine Fisheries Service in March 1999 as threatened under the Endangered Species Act.

Coho

Releases and Transfers: Coho production at Quilcene NFH included 437,222 Quilcene stock yearlings. Twenty-four thousand nine hundred seventy-five fingerlings were released upstream in lieu of adult passage this year. In February, 1999 we transferred 190,006 Quilcene coho pre-smolts from the 1997 brood to the Skokomish tribe for rearing at their Quilcene Bay net-pen facility. We also transferred 450,000 eyed eggs to the George Adams state fish hatchery for subsequent hatching, rearing, and transfer to the Port Gamble tribal net pen program.

Tags and Marks Applied: We coded-wire tagged 49,283 adipose-clipped coho and 45,985 unclipped coho for the Quilcene Bay net pen program. We coded-wire tagged 50,270 adipose-clipped coho and 47,887 unclipped coho for the on-station release. Another 339,374 adipose clipped but untagged coho were marked for the Quilcene on-station release.

Terminal Area Returns, 1998: Adult returns provided sufficient spawners to meet program needs for 1998. Escapement to the hatchery was 11,384. Net fisheries harvested 3,298 coho in the terminal fishery in Quilcene Bay.

Recoveries of Coded-Wire Tags: Fifty-four percent (6,121) of the coho returning to the hatchery were sampled for coded-wire tags. Eight hundred fifty-one tags were recovered, representing fifteen different codes. Expanding the tag recoveries to account for the sampling rate yields an estimated total of 1,577 tag recoveries. Five hundred and ninety-nine (38%) of these tag recoveries were from coho that originated from releases from the net-pen program in Quilcene Bay. Besides hatchery recoveries, Canadian and Washington sport and commercial fisheries also catch Quilcene NFH coho.

Discussion/Recommendations: The coho program at Quilcene continues to support sport and commercial fisheries in Canadian and US waters and a terminal fishery in Quilcene Bay. Due to the earlier run timing of Quilcene stock coho, there is concern about the interception harvest of summer chum, which enter Quilcene Bay simultaneously. Fishery managers have modified the terminal coho fishery to emphasize beach seine methods, which allow fishers to return summer chum to the water alive.

Chinook

Releases and Transfers: The hatchery released no spring chinook during this period. This program was terminated in 1994 due to poor survival rates.

Terminal Area Returns, 1998: A total of 8 chinook adults returned to the hatchery rack. We biosampled 50% of the return to find age composition. Age three and age four fish were equally represented.

Recoveries of Coded-Wire Tags: All chinook returning to the hatchery were sampled for coded-wire tags. No tags were recovered.

Discussion/Recommendations: The spring chinook program has been discontinued at Quilcene due to poor return rates and the lack of a genetically pure donor stock. The presence of chinook indicates that these fish are either remnant spring chinook established from the previous hatchery program or strays of fall chinook from other nearby systems.

Summer Chum

Releases and Transfers: The hatchery released a total of 343,530 feeding summer chum fry in 1999. We transferred 217,465 eyed summer chum eggs to WDFW for rearing and reintroduction into Big Beef Creek.

Marks Applied: We marked 343,371 summer chum with an adipose fin clip in February 1999. Returning fish with adipose clips will document the success of the hatchery program and will allow for separation of hatchery-origin and natural-origin adults.

Terminal Area Returns, 1998: Five hundred forty-four adult summer chum were handled at the hatchery. These fish came from returns to the hatchery rack and from broodstocking conducted during the coho fishery held in Quilcene Bay. In addition, an estimated 2,247 fish remained in the river and spawned naturally. We biosampled 73% of the summer chum at the hatchery to determine age composition. Three-year-old fish predominated in the run processed at the hatchery.

Recoveries of Adipose Marks: No marked fish were expected to return this year, and no marks or tags were observed.

Discussion/Recommendations: Total returns of large numbers of adult to the Big Quilcene River indicate positive results from hatchery supplementation and significant progress toward restoration of the run.

Fall Chum

Releases and Transfers: The hatchery released 2,209,761 feeding chum fry into the Big Quilcene River. A total of 40,000 chum were transferred to Batelle Research for marine migration experiments in Admiralty Inlet.

Terminal Area Returns, 1998: A total of 4,695 adult fall chum returned to the hatchery rack. In addition, an estimated 874 fish remained in the river and spawned naturally. We biosampled 14% of the hatchery return to determine age composition. Most of the fish were four years old. Run reconstruction by WDFW shows that over 3,600 fall chum (600 natural origin, 3,000 hatchery origin) from the Quilcene River system were caught in 1998 net fisheries in Washington waters.

Discussion/Recommendations: This program continues successfully as a composite of hatchery and natural production.

MAKAH NATIONAL FISH HATCHERY

Guidance for fish production at Makah NFH is provided through a steering committee with representation from the USFWS, the Makah Tribe, and WDFW. Coho smolt production was mass marked with an adipose fin clip to identify them as hatchery fish for harvest in selective sport fisheries. Paired tag groups, both clipped and unclipped, were released to determine mortality effects on those fish caught in selective fisheries but released based on their adipose clip status.

Coho

Releases and Transfers: Coho production at Makah NFH included 187,391 yearlings released into the Sooes River. We transferred 30,075 subyearling coho to the Makah Tribe for further rearing, imprinting, and release at their Educket Creek facility on the Waatch River system.

Tags and Marks Applied: In December 1998 we applied coded-wire tags to 41,294 adipose-clipped coho and 39,917 unclipped coho for the Sooes River release. Another 106,321 adipose-clipped but untagged coho were also marked for the Sooes River release. We also adipose clipped another 30,108 untagged coho for transfer to Educket Creek.

Terminal Area Returns, 1998: Coho returns provided sufficient spawners to meet program needs for 1998. Escapement to the hatchery was 3,415. Of these, we passed 2,073 fish upstream of the weir to contribute to natural production. The Sooes River net fishery harvested 3,574 coho in the river below the hatchery.

Recoveries of Coded-Wire Tags: Thirty-two percent (1,079) of the coho returning to the hatchery were sampled for coded-wire tags. Two hundred fifty-three tags were recovered, representing sixteen different codes. Expansion of tags to account for subsampling of fish passed upstream yields an estimate of 782 tagged fish recovered. Thirty-five of these tags, representing an estimated one hundred eighty-three tagged fish, originated from releases made from the Educket Creek facility. Besides hatchery recoveries, Canadian and Washington sport and commercial fisheries also catch Makah NFH coho.

Discussion/Recommendations: We abandoned our previous efforts to separate the timing of the coho run and the chinook run. We were unsuccessful in creating a separation in run timing during the relatively few years of the program, and the chinook run is building to a point where incidental or directed take of chinook during coho fisheries will not negatively impact the program.

Fall Chinook

Releases and Transfers: The hatchery released 3,081,900 fall chinook between mid-May and mid-June. We are continuing to attempt a strategy of releasing chinook as late as possible, depending on water availability, to improve survival. A total of 95,900 chinook was transferred to the tribal facility at Educket Creek.

Tags Applied: A total of 262,938 fall chinook was coded-wire tagged in April 1999. These fish are an indicator group for the Pacific Salmon Treaty chinook stock rebuilding program.

Terminal Area Returns, 1998: A total of 2,134 fall chinook returned to the hatchery rack. We biosampled 35% of the return to determine age composition. Age five fish were most common. We passed 571 chinook above the hatchery to spawn in the Sooes River. Five hundred and eighty-five chinook were reported captured in directed chinook fisheries in the lower Sooes River.

Recoveries of Coded-Wire Tags: Forty-seven percent (1,012) of the fall chinook returning to the hatchery were sampled for coded-wire tags. Eighty-nine tags were recovered, representing 12 different codes. Expansion of tags to account for subsampling of fish passed upstream yields an estimate of 196 tagged fish recovered. Besides hatchery recoveries, Canadian, Alaskan, and Washington sport and commercial fisheries catch Makah NFH fall chinook.

Discussion/Recommendations: The chinook program continues to build at Makah. A recurring problem at the hatchery is the lack of water in the Sooes River when adult chinook return. The hatchery is unable to operate the fish ladder until fall flows increase and adults must hold in the river below the weir.

Winter Steelhead

Releases and Transfers: The hatchery released a total of 135,940 steelhead yearlings into the Sooes River. Twenty thousand steelhead subyearlings were transferred to the Makah Tribe for rearing and release at their Educket Creek facility.

Marks Applied: No steelhead were marked. Previously marked year classes indicate that hatchery origin steelhead have a well-defined earlier return timing than wild origin steelhead.

Terminal Area Returns, 1998-99: A total of 3,025 adult steelhead returned to the hatchery rack from November 2 to February 22. After that time the ladder was closed and fish were allowed to pass upstream uncounted. Based on previous mark recoveries, we know that fish returning in the fall and winter are of hatchery origin and that fish returning in the early spring are of wild origin. We biosampled 18% of the hatchery steelhead to find age composition. Most of the fish were three years old. A total of 3,017 steelhead was caught in net fisheries in the Sooes and Waatch Rivers.

Fall Chum

Releases and Transfers: The hatchery released no chum fry in 1999.

Terminal Area Returns, 1998: A total of 27 adult fall chum are recorded as having returned to the hatchery rack. Twenty-six of these fish were passed above the hatchery to spawn naturally.

Discussion/Recommendations: The hatchery production program was discontinued in 1996. The chum run in the Sooes River has historically been small as there is limited estuarine area for juvenile growth. The production program was founded with outside stocks, which have been unsuccessful at increasing the run size.

QUINAULT NATIONAL FISH HATCHERY

Production levels for Quinault NFH are set through joint agreement between the USFWS and the Quinault Tribe in a steering committee. We forwarded three items to policy representatives for resolution: language changes to the cooperative agreement, options for managing risk to the Quinault NFH fall chinook broodstock program, and an unfunded plan for a coho rearing density study. This year the Service conducted weekly spawning surveys for fall chinook on the one mile of Cook Creek below the hatchery. Coded-wire tags from the surveys, numbers of live and dead fish observed, and redd counts were provided to Quinault Tribal fisheries for expansion and reporting. The Chinook Technical Committee of the Pacific Salmon Commission has requested the escapement information in order to use the Quinault River stock as an indicator group.

Coho

Releases and Transfers: Coho production at Quinault NFH included 528,533 yearlings released on-station and 20,016 sub-yearlings transferred off-station to Camp 7 pond.

Tags Applied: We applied coded-wire tags to 84,443 adipose-clipped coho yearlings and 82,845 unclipped coho in November 1999 for the on-station release to Cook Creek. Another 15,232 adipose clipped yearlings were coded-wire tagged to evaluate the release into natural rearing habitat at Camp 7 near the mainstem Quinault River. The pairing of clipped and unclipped tagged fish will be used to model the survival of unclipped wild fish and to assess harvest mortality in selective ocean fisheries that use the adipose clip as an identifier for harvestable fish.

Terminal Area Returns, 1998: Coho returns provided sufficient spawners to meet program needs for 1998. Escapement to the hatchery was 3,370 adults and jacks.

Recoveries of Coded-Wire Tags: We sampled all of the coho returning to the hatchery for coded-wire tags. Four hundred eighteen tags were recovered, representing seventeen different codes. Besides hatchery recoveries, Canadian and Washington sport and commercial fisheries also catch Quinault NFH coho.

Discussion/Recommendations: Coho density levels have been reduced since the 1991 brood in an attempt to produce smolts with a lower incidence of bacterial kidney disease. It is thought that kidney disease may be a factor in the low coho survival rates (~2.0% mean) seen at Quinault NFH.

Fall Chinook

Releases and Transfers: The hatchery released 239,809 fall chinook fingerlings of mixed Cook Creek stock and Quinault Lake stock into Cook Creek.

Tags Applied: In May 1999 we coded-wire tagged 208,345 fall chinook for release into Cook Creek. This release is tagged as an indicator group for the Pacific Salmon Commission's chinook stock rebuilding program.

Terminal Area Returns, 1998: Sixty-one fall chinook returned to the hatchery rack. We scale sampled 69% of the fish at the hatchery to determine age composition. Most of the fish were five years old.

Recoveries of Coded-Wire Tags: All fall chinook handled at the hatchery were sampled for coded-wire tags. We recovered 11 tags, representing 4 different codes. Besides hatchery recoveries, Canadian, Alaskan, and Washington sport and commercial fisheries catch Quinault NFH fall chinook.

Discussion/Recommendations: Insufficient broodstock were obtained from the run into the hatchery to meet the programmed production of 600,000 chinook. Additional eggs were obtained from broodstock captured with tended gillnets fished at the tribe's Quinault Lake net pen facility.

Winter Steelhead

Releases and Transfers: The hatchery released 252,647 yearling steelhead at the hatchery and 49,372 at Allen's Bar on the Hoh River. Transfers to tribal facilities included 49,126 fish to the Hoh Tribal facility at Chalaat Creek and 5,397 fish to the Quinault Lake Tribal facility.

Tags and Marks Applied: Coded-wire tags were applied to 25,931 steelhead for the on-station release to Cook Creek. A total of 15,840 steelhead for transfer to the Chalaat Creek facility was coded-wire tagged and 33,365 fish were adipose-clipped only. A total of 28,625 steelhead for the release at Allen's Bar on the Hoh River was coded-wire tagged and an additional 21,371 fish for this release were adipose clipped to identify them as hatchery fish. Tagging and clipping was conducted in November 1998.

Terminal Area Returns, 1998-99: A total of 2,963 adult steelhead returned to the hatchery rack. We biosampled 18% of the returning steelhead to determine age composition. Most of the fish were three years old. An estimated 2,484 steelhead were caught in terminal fisheries in the 1998-99 catch year.

Recoveries of Coded-Wire Tags: All returning steelhead were sampled for coded-wire tags. Three hundred twenty tags were recovered, representing seven different codes. Thirty-two of these tag recoveries were from Quinault NFH origin steelhead transferred to other facilities or released off-station, at Chalaat Creek, and Hoh River.

Discussion/Recommendations: The steelhead program continues to support a vigorous net fishery in the Quinault River and a sport fishery in both the Quinault River and Cook Creek.

Fall Chum

Releases and Transfers: The hatchery released a total 1,540,032 feeding chum fry in 1999.

Terminal Area Returns, 1998: A total of 2,497 adult fall chum returned to the hatchery rack. We biosampled 73% of the rack return to determine age composition. Age three fish were most common. Considerable spawning has been documented in Cook Creek below the hatchery rack.

Discussion/Recommendations: The large spawning population of chum in Cook Creek supports the notion that this stock should be considered a wild/hatchery composite.

ACKNOWLEDGMENTS

Much of the data required for hatchery evaluation, programming, and coordination is collected solely by hatchery staff. That which is not is collected cooperatively with WWOBFA staff. Many suggested program changes and evaluation ideas originate from hatchery personnel. Makah, Quinault, and Quilcene NFH staff have contributed significantly to the current success and future direction of the hatcheries through their innovative ideas and cooperative natures. Fishery catch data are the result of sampling programs conducted by the WDFW, Northwest Indian Fish Commission, and the Quinault Department of Natural Resources.

LITERATURE CITED

USFWS. 1991. Fisheries Resource Evaluation Database Users Manual. Western Washington Fishery Resource Office. Olympia, Washington. 131pp.

Table 1. Fisheries Resource Evaluation Database (FRED) data collected from Olympic Peninsula National Fish Hatcheries, August 1, 1998 to July 31, 1999.

	Quilcene NFH				Makah NFH				Quinault NFH			
	Coho	Chinook	Summer chum	Fall chum	Coho	Fall chinook	Winter steelhead	Fall chum	Coho	Fall chinook	Winter steelhead	Fall chum
Adult entry	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Fish removal	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Group spawning	✔		✔	✔	✔	✔	✔		✔	✔	✔	✔
Mark sampling	✔	✔	✔		✔	✔			✔	✔	✔	
Mark recovery	✔	✔	✔		✔	✔			✔	✔	✔	
Scale sample		✔	✔	✔		✔	✔			✔	✔	✔
Marking	✔		✔		✔	✔			✔	✔	✔	
Fish/egg transfer	✔		✔		✔		✔		✔	✔	✔	
General release	✔		✔	✔	✔	✔	✔		✔	✔	✔	✔
Specific release	✔		✔	✔	✔	✔	✔		✔	✔	✔	✔

Table 2. Programmed production for broods released from Olympic Peninsula National Fish Hatcheries, 8/1/98 - 7/31/99.

Hatchery	Species	Broodyear	Life stage	Number to release	Number to transfer
Quilcene NFH	Coho	1998	egg	0	450,000
	Coho	1997	smolt	450,000	300,000
	Summer chum	1998	fed-fry	400,000	200,000
	Fall chum	1998	fed-fry	2,200,000	0
Makah NFH	Coho	1997	smolt	250,000	50,000
	Fall chinook	1998	smolt	3,200,000	100,000
	Winter steelhead	1998	smolt	175,000	25,000
Quinault NFH	Coho	1997	smolt	660,000	0
	Fall chinook	1998	smolt	600,000	0
	Winter steelhead	1998	smolt	240,000	0
	Winter steelhead	1998	fingerling	0	50,000
	Fall chum	1998	fed-fry	1,500,000	0

Table 3. Release and tagging information for Olympic Peninsula National Fish Hatcheries, August 1, 1998 to July 31, 1999.

Hatchery	Species	Brood	Stock	Release site	Release date(s)	Size at release (g)	Tagcode	Tags released	Tag rejects released	Untagged released	Percent of release tagged	Month tagged	Size at tagging (g)	Tag retention rate (%)
Quilcene	Coho	97	Quilcene River	Quilcene River	05/07/99	25.6	051323	11,736	338	0	96.7	Oct 98	11.9	97.2
	"	97	"	"	05/07/99	25.6	051324	11,305	293	0	96.7	Oct 98	11.9	97.5
	"	97	"	"	05/07/99	25.6	051325	11,451	595	0	96.7	Oct 98	11.9	95.1
	"	97	"	"	05/07/99	25.6	051326	11,743	341	0	96.7	Oct 98	11.3	97.2
	"	97	"	"	05/07/99	25.6	051542	12,570	283	86,998	12.4	Oct 98	11.9	97.8
	"	97	"	"	05/07/99	25.6	051543	12,234	271	84,642	12.4	Oct 98	11.9	97.8
	"	97	"	"	05/07/99	25.6	051544	11,789	778	85,062	12.4	Oct 98	11.9	93.8
	"	97	"	"	05/07/99	25.6	051552	11,820	382	82,591	12.4	Oct 98	11.3	96.9
	"	98	"	"	05/12/99	1.6				24,975				
	Summer chum	98	"	"	03/08/99-04/02/99	1.3				333,409				
	"	98	"	"	03/08/99-04/02/99	1.3				10,121				
	Fall chum	98	"	"	05/03/99	0.6				2,209,761				
Makah	Coho	97	Sooes River	Sooes River	04/21/99-04/27/99	26.1	051553	9,921	521	26,947	41.4	Dec 98	15.1	95.0
	"	97	"	"	04/21/99-04/27/99	26.1	051554	9,567	402	0	41.4	Dec 98	15.1	95.9
	"	97	"	"	04/21/99-04/27/99	26.1	051555	10,062	169	26,402	41.4	Dec 98	15.1	98.3
	"	97	"	"	04/21/99-04/27/99	26.1	051556	9,068	536	0	41.4	Dec 98	15.1	94.4
	"	97	"	"	04/21/99-04/27/99	26.0	051804	9,638	535	26,253	41.4	Dec 98	15.1	94.7
	"	97	"	"	04/21/99-04/27/99	26.1	051904	9,483	729	0	41.4	Dec 98	15.1	92.8
	"	97	"	"	04/21/99-04/27/99	26.1	052151	10,036	318	26,720	41.4	Dec 98	15.1	96.9
	"	97	"	"	04/21/99-04/27/99	26.1	052307	9,862	222	0	41.4	Dec 98	15.1	97.8
	Fall Chinook	98	"	"	05/10/99	6.5	051561	58,759	7,997	750,944	8.1	Apr 99	3.6	88.0
	"	98	"	"	05/23/99	6.5	051562	63,649	3,013	739,338	8.1	Apr 99	3.6	95.5

Table 3. Release and tagging information for Olympic Peninsula National Fish Hatcheries, August 1, 1998 to July 31, 1999. (cont.)

Hatchery	Species	Brood	Stock	Release site	Release date(s)	Size at release (g)	Tagcode	Tags released	Tag rejects released	Untagged released	Percent of release tagged	Month tagged	Size at tagging (g)	Tag retention rate (%)
	"	98	"	"	05/30/99-06/12/99	6.5	051563	64,812	523	682,127	8.1	Apr 99	3.6	99.2
	"	98	"	"	05/30/99-06/12/99	6.5	051604	61,131	994	648,613	8.1	May 99	3.6	98.4
	Winter steelhead	98	"	"	04/19/99-04/29/99	67.3				135,940				
Quinault	Coho	97	Cook Creek	Cook Creek	04/16/99	32.4	051327	20,067	578	0	30.1	Nov 98	18.1	97.2
	"	97	"	"	04/16/99	32.4	051328	19,866	1,046	91,782	30.1	Nov 98	18.1	95.0
	"	97	"	"	04/16/99	32.4	051329	20,450	503	0	30.1	Nov 98	15.1	97.6
	"	97	"	"	04/16/99	32.4	051330	19,811	613	89,640	30.1	Nov 98	15.1	97.0
	"	97	"	"	04/16/99	32.4	051332	20,674	385	0	30.1	Nov 98	15.1	98.2
	"	97	"	"	04/16/99	32.4	051502	18,196	1,932	88,341	30.1	Nov 98	15.1	90.4
	"	97	"	"	04/16/99	32.4	051540	19,744	1,624	0	30.1	Nov 98	13.0	92.4
	"	97	"	"	04/16/99	32.4	051541	20,474	547	92,260	30.1	Nov 98	13.0	97.4
	Fall Chinook	98	Quinault River	"	07/14/99	6.1	051605	51,289	940	8,106	82.7	Jun 99	3.0	98.2
	"	"	"	"	07/14/99	6.1	051606	47,198	3,618	7,887	82.7	Jun 99	3.0	92.9
	"	"	"	"	07/14/99	6.1	055017	49,250	3,144	8,132	78.6	Jun 99	3.0	94.0
	"	"	"	"	07/14/99	6.1	055018	45,684	6,467	8,094	78.6	Jun 99	3.0	87.6
	Winter steelhead	98	"	"	05/13/99	73.1	213110	24,404	1,420	226,823	9.7	Nov 98	37.8	94.5
	Winter steelhead	98	"	Hoh River	05/14/99	46.9				43,719				

Table 4. Adipose clip status for coho smolts released from Olympic Peninsula National Fish Hatcheries, August 1, 1998 to July 31, 1999.

		Unclipped			Adipose clipped			percent of release with adipose clip
Hatchery	Brood	Untagged	Tagged	Tagcodes	Untagged	Tagged	Tagcodes	
Quilcene	98	1,567	46,235	051323	341,007	48,413	051542	89.1%
				051324			051543	
				051325			051544	
				051326			051552	
Quinault	98	366,161	78,347	051328	3,090	80,935	055021	15.9%
				051330			055022	
				051502			055023	
				051541			055024	
Makah	98	1,889	37,980	051554	107,865	39,657	051263	78.7%
				051556			051317	
				051904			055029	
				052307			055031	
							055033	

Table 5. Transfer information for Olympic Peninsula National Fish Hatcheries, August 1, 1998 to July 31, 1999.

Hatchery	Species	Brood	Stock	Transferred to	Date transferred	Size at transfer (g)	Number of fish
Quilcene	Coho	97	Quilcene	Quilcene Bay Net Pens	02/11/1999	17.9	190,006
	Chum	98	Quilcene	Batelle Research	05/07/1999	0.6	40,000
Makah	Coho	97	Makah	Educket Creek	03/11/1999	21.6	30,075
	Fall chinook	98	Makah	Educket Creek	03/02/1999	1.2	95,900
	Winter steelhead	97	Makah	Educket Creek	04/14/1999	59.0	20,000
Quinault	Coho	97	Quinault	Camp 7 pond	03/25/1999	27.0	20,016
	Winter steelhead	98	Quinault	Chalaat Creek	02/19/1999	30.5	49,126
	Winter steelhead	98	Quinault	Quinault Lake	07/08/1999	168.1	5,397

Table 6. Rack return of salmon and steelhead to Olympic Peninsula National Fish Hatcheries, August 1, 1998 to July 31, 1999.

Hatchery	Species	Number returned
Makah NFH	Fall chum	27
	Coho	3,415
	Pink	1
	Fall chinook	2,134
	Winter steelhead	3,025
Quilcene NFH	Fall chum	4,695
	Coho	11,384
	Chinook	8
	Summer chum [1]	544
Quinault NFH	Fall chum	2,497
	Coho	3,370
	Fall chinook [1]	61
	Winter steelhead	2,963
Walcott Slough	Fall chum	4

[1] From broodstocking efforts and rack return.

Table 7. Age composition of salmon and steelhead returning to Olympic Peninsula National Fish Hatcheries, 1998-99, in percent.

Species	Hatchery	age2	age3	age4	age5	age6	percent of run aged
Chum	Quilcene	0	34	65	2	0	14
	Quinault	0	0	99	1	0	10
Summer chum	Quilcene	0	66	34	1	0	73
Fall chinook	Makah	3	14	34	49	0	35
	Quinault	2	10	31	55	2	69
Chinook	Quilcene	0	50	50	0	0	50
Winter steelhead	Makah	1	75	24	0	0	18
	Quinault	0	69	30	0	0	18

Table 8. Recoveries of coded-wire tags from Olympic Peninsula National Fish Hatcheries, 8/1/98 - 7/31/99.

Hatchery	Species	Number of codes	Number of tags	Expansion factor
Quilcene NFH	Coho	15	851	1.85
Quinault NFH	Fall chinook	4	11	1.09
	Coho	17	418	1.02
	Winter steelhead	7	320	1.02
Makah NFH	Fall chinook	12	89	2.20
	Coho	16	253	3.09
			1,942	